The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLIX
No. 1277

SATURDAY, DECEMBER 18, 1943
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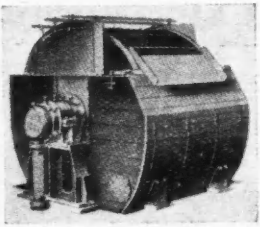

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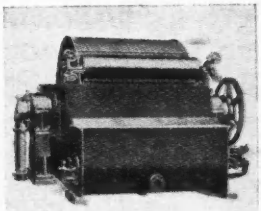

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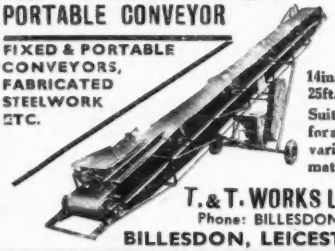

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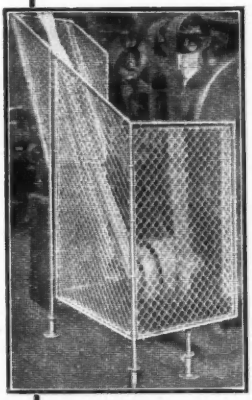

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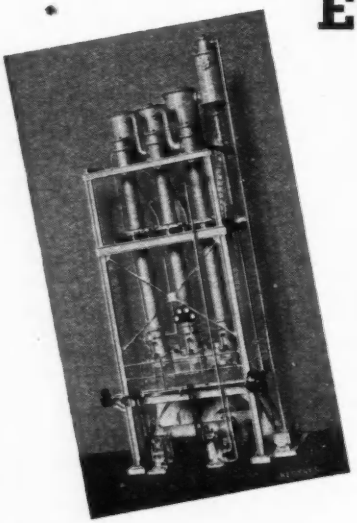

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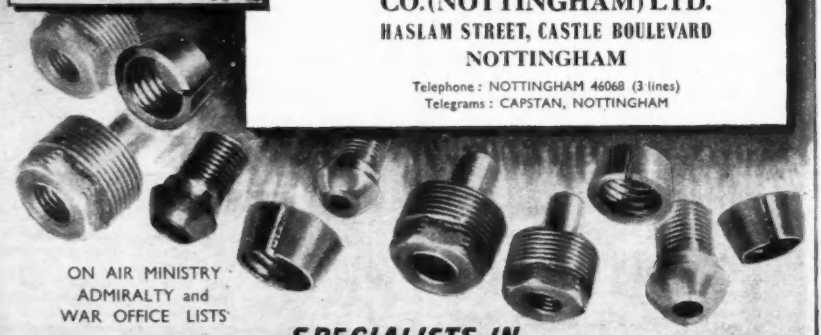

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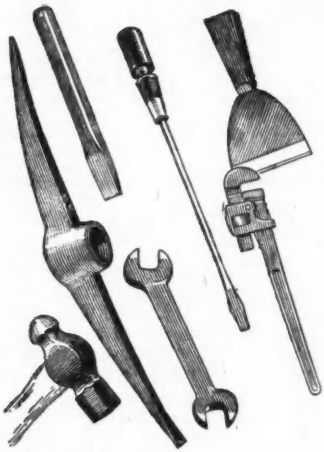

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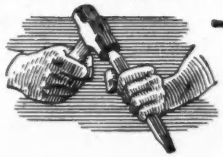

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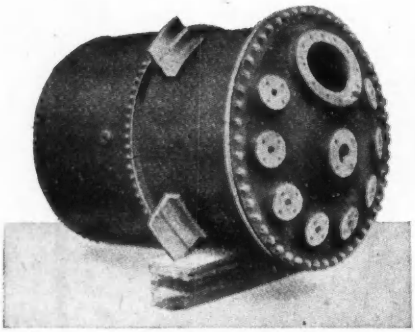

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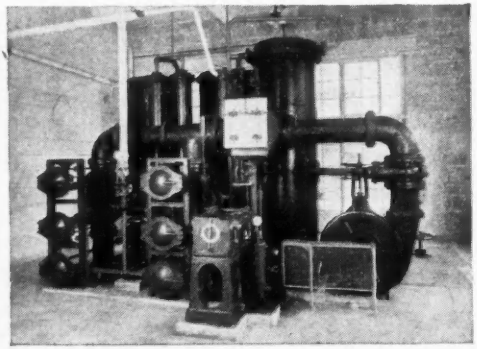

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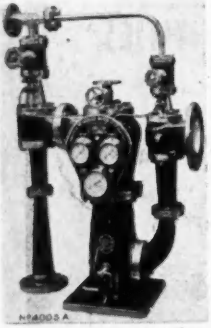

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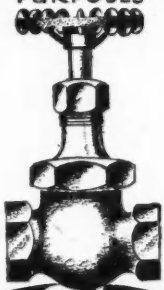

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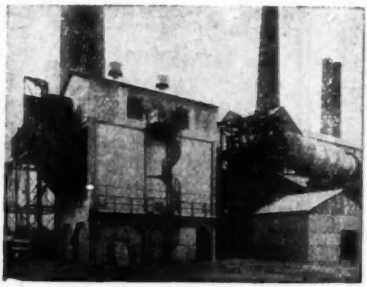

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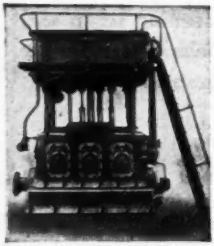

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More About Planning

TWO aspects of post-war planning have been ventilated during the past two weeks in these columns and it will have been noticed that the general principles have been suggested of (1) improved utilisation of raw materials, (2) improved design and manufacturing methods for raw materials of construction, and (3) a proper organisation of industry in many directions to enable it to function in the best and most efficient manner. Among the companies in America which have been most conspicuous for research work and for expenditure on research the Du Pont Company stands out pre-eminently. A few months ago Mr. L. Du Pont gave an address in which he discussed the attitude of his own organisation towards the problems of the transition from war to peace. Mr. Du Pont's address gave evidence of a wide vision and is well worth study by industrialists in this country.

In common with most people on this side of the Atlantic, Mr. Du Pont maintains that full employment is the key to prosperity in the reconstruction period. It is of no use looking to the governments of the world or to any magic formula of reconstruction for our prosperity. Unemployment relief, insurance and all the other means which mankind has found of alleviating distress when it occurs are of no value as a general solution to the subject. In Mr. Du Pont's words: "Any form of dole or hand-out, whether at home or abroad, can result only in loss of initiative, loss of self-respect, and ultimate despair on the part of the recipient and bankruptcy on the part of the donor." By freedom from want as laid down in the Atlantic Charter, Mr. Du Pont does not mean "freedom from want as represented by the gift of a quart of milk a day"; he means "freedom to work and earn enough money to buy milk and for that matter everything else that is needed." If these desires are to be implemented it is necessary for industry to plan ahead. The Du Pont Company has set up a group in their development department nearly two years ago to consider post-war problems. This group made an exhaustive survey to determine, among other things, what new products the company would have ready for immediate exploitation, what existing products might find increased outlets, and the prospective post-war increase in annual sales volume, with an estimate of the resultant increase

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in employment. Among the specific recommendations made by the Du Pont planning group was that each operating department should: (1) prepare plans to be followed on cancellation of Government orders; (2) prepare plans for changing over from war-time to normal products; (3) plan in advance the rate of production required for all products to supply the current demand and rebuild inventories; (4) make provision, to the design stage, for new plants, either for expansion or for new products; (5) make advance marketing studies, estimates of requirements, etc.; (6) study each item produced to determine whether war-time changes have developed new uses for it, or eliminated its use in any product; (7) consider the use of raw materials which will be available in excess quantities after the war for the manufacture of new products, or to replace more expensive raw materials hitherto used; and (8) estimate the number of employees required for post-war production, and have rehiring plans ready.

In making these plans it is assumed that certain fundamentals will be respected, for instance: (1) sound money based preferably on the gold standard; (2) taxes at such a level as to give industry the incentive to expand and pioneer; and (3) absence of government competition. Another fundamental is that under the private enterprise system each and every entity shall plan for itself. "Enforcement of a plan upon someone else," as Mr. Du Pont says, "is dictation, and dictation never is acceptable to anyone." Meetings of committees and regional and national conferences serve to give incentive. But when problems are actually tackled, each company or corporation must consider its own needs and work out each solution, not selfishly, but with consideration of the greatest good for the greatest number, with fair profits to the manufacturer as well as fair wages to the worker and fair prices to the consumer. The purpose of Government in its relation to industrial matters should be "to increase and develop the productivity of the nation as a whole so that there will be constantly more and more goods for all the people to enjoy."

Mr. Du Pont points out that he would be "the last man to suggest that free enterprise should be left so free that it would be subject only to the law of the jungle and the survival of the strongest. But it should be free for the development of all the initiative and incentive that can be coaxed out of every individual, whatever his station in life. It should be free for the encouragement of every man with savings to put those savings to work in a productive way towards the greater development of the country. And to that end saving on the part of every individual should be encouraged. It should be free for the development of every scientific idea, for from the test tubes of science come great improvements in living standards. It is out of these same test tubes that the major improvements of the future give promise."

Mr. Du Pont's address leaves it clear to all that the American view is that Government should not interfere with industry any more than is absolutely necessary for the regulation of a reasonable conduct of business. In so far as Government can assist business it should do so, but business generally must work its own salvation and nothing that Government can do can take the place of that. It is unfortunate that during a war the whole nation comes under the control of a bureaucracy; the nation is organised for war as an army is organised. Manufacturers and others are told what to do and it is their job to do it. Initiative is cut down to a minimum and regimentation rises to a maximum. This unfortunately engenders a feeling that when things go wrong it is only necessary to cry to the Government for them to be put right. Nothing, in fact, could be farther from the truth. Indeed, the exact contrary appears to have ruled in America, and dependence on the Government, which was the basis of the "New Deal," appears to have led to such restrictions on industry as to reduce prosperity. In Mr. Du Pont's words: "The problem is no longer how to produce enough so that every man who works and does his share can have things he never before dreamed of owning. The problem is not how to build the machinery. The problem is how to take away the cold, dead hand of bureaucracy that, until released by the demands of this war, held the throttle at half speed."

NOTES AND COMMENTS

Fire in the Works

IT has been stated—and the figure seems quite credible—that 200 million cigarette-ends are thrown away in this country every day. If only one in a million of these chances to fall on inflammable material, opportunity is afforded for starting 200 fires a day. Moreover, the dreaded cigarette-end is not the only means of starting a fire. We are, therefore, offering no apologies for devoting, in this issue, a considerable space to fire prevention as a safety-first feature which should be of the highest interest to all engaged in the chemical industry. The trouble with fire-precaution regulations is that they are so simple. Most people are quite confident that they can never be so careless as not to observe such elementary rules: some indeed are apt to be not a little bored, or even aggrieved, when their attention is called to such regulations. Yet, despite this confidence, fires, industrial and otherwise, keep on occurring, much to the detriment of our war effort—not to mention the loss of life that is too often occasioned. The fact is that no one among us is completely free from "absence of mind"—we even remember once starting a small conflagration ourselves, in our unregenerate days before we read "Safety Notes," by absently knocking a pipe out into a wastepaper basket. The only remedy is for the book of rules to become second nature: habit is everything.

Space for Chemistry

FIRED by the example of the president of the Royal Society, whose stirring demand for a national centre for science was recorded in our last issue, Dr. W. H. Mills, president of the Chemical Society, has also put forward a plea for adequate official recognition of the debt owed by the nation to science. In a letter to *The Times* he describes in detail the ridiculously constricted quarters in which his society is forced to carry on its vitally important work, and he goes so far as to designate the present position as "desperate." This is no exaggeration. The Chemical Society, he says, plays an indispensable part in promoting the advances in pure chemistry without which industry cannot progress. Yet this indispensable work is hampered at every turn by the preposterously cramped accommodation within which its executants are confined. Of the magnificent chemical library, only 19,000 volumes out of 45,000 are reasonably accessible; and for new acquisitions even storage space is now unobtainable. Administration is carried out in one small office, and for editorial work there is no office at all. In time of war, no doubt, we are prepared to achieve the impossible; but this war will end some day. Then, if our industries are to maintain their rightful place in the world, the importance of the sciences that enable them to advance with the times must be officially recognised by the provision of a suitable centre to house them. Such a centre, be it noted, must be conceived in no niggardly spirit, but must include space for the inevitable expansion.

Whitehall and Portland Place

SYMPTOMATIC of the growing awareness of the need to make the community realise the vital importance of science—"the fifth estate" as Mr. Cohoe has called it—were the two deputations which the scientific world organised this week. On Wednesday representatives of the Parliamentary and Scientific Committee, headed by Lord Samuel, went to Whitehall and were received by several cabinet ministers including Mr. Attlee, Sir John Anderson, and Mr. R. A. Butler. We understand that it was the President of the Board of Education who invited the committee to send the deputation so that he could discuss the recommendations put forward in their recent report about the part the universities must play in the organisation of post-war research. The presence of the Chancellor of the Exchequer at this meeting was not unexpected in view of the committee's demand for a great increase in the Treasury grant to the universities. On the preceding day the British Association's president, Sir Richard Gregory, called on the B.B.C., in company with Professors F. T. Brooks and Allan Ferguson, Dr. Julian Huxley, and Sir Richard Paget. For some time past there has been a feeling that science does not receive its fair

share of radio time, and that feeling was given vivid expression at the B.A. conference held this year when the suggestion was made to Sir Allan Powell, who was in the chair, that Broadcasting House should set up a science advisory committee and appoint a science liaison officer, with the aim of improving the quality of science programmes. Sir Allan said he would take these ideas away with him, and brood over them. The object of the deputation was to find out whether he had hatched anything.

Five Years of the B.C.U.R.A.

IT was six years ago this month that the projected establishment of the British Coal Utilisation Research Association received the approval of the D.S.I.R. The development of this organisation into one of the most go-ahead research associations in the country provides a lesson in the value of co-operative research which should be studied by those industries that still have no research association of their own. The B.C.U.R.A. has just published an invigorating report entitled *The First Five Years*. It tells how the association was organised in spite of the widespread pessimism that existed as to the prospects of centralised industrial coal research. The founders of the B.C.U.R.A. had convinced themselves that the field of coal utilisation research was not unpromising; new techniques in physical and chemical research were ready to hand, and there were adequate resources for developing and applying research results. The Mining Association had indicated that financial support to the tune of £80,000-£100,000 a year would be available from the coal owners, and the D.S.I.R. offered up to an annual maximum of £50,000. How far they were justified in their financial optimism is shown in the fact that the B.C.U.R.A. entered its second lustre with an income of £170,000 for the year 1943.

New Outlook on Research

HOW the B.C.U.R.A. set about assembling its research team makes a fascinating story. There was no well-established tradition of successful coal research to follow, and there were no research workers experienced in this field who could join the staff. This apparent drawback conferred upon the new research association the advantage of being able to develop an entirely new outlook on the research problems involved. A further advantage was that, although the B.C.U.R.A. policy was to concentrate on problems that industry regarded as urgent and important, its founders were content to wait while the staff could be trained and given experience. (We wonder how often sponsors of new research associations have adopted this attitude; we are quite sure that such an attitude will always pay the richest dividends in the long run.) It was Lord Rutherford who suggested that the B.C.U.R.A. should begin by recruiting a team of physicists. Dr. D. H. Bangham was appointed head of the scientific staff. It is significant that the research workers who joined him were young physicists, scarcely any of them with any previous knowledge of coal or its combustion, but all with a knowledge of the latest techniques developed in such leading schools as the Cavendish Laboratory. At first this band of workers depended largely on outside experience and advice, but to-day it is an effective research team capable of breaking new ground, and self-reliant in a major degree. The results now coming out of these laboratories abundantly justify the policy adopted.

Zinc Pigments

New Association Formed

AN association to be known as the Zinc Pigment Development Association has been formed, comprising the leading British producers of zinc pigments. Its principal object is to encourage and develop the uses, actual and potential, of zinc pigments by all appropriate means, particularly by making their properties and applications more widely known and appreciated. The Association is strictly non-commercial in character.

The following is a list of the founder members: Amalgamated Oxides (1939), Ltd., Barking Zinc Oxide, Ltd., James M. Brown, Felling Zinc Oxide Co., Fricker's Metal & Chemical Co., Ltd., McKechnie Bros., Ltd., The Newcastle-upon-Tyne Zinc Oxide Co., Ltd., and Orr's Zinc White, Ltd., Mr. G. H. C. Gundry and Mr. D. J. W. Orr have been elected first chairman and deputy-chairman respectively.

The Association will work in co-operation with the Zinc Development Association at Lincoln House, 15 Turl Street, Oxford (Tel. 48088).

Fire Prevention

Some Advice to the Individual Worker

by JOHN CREEVEY

LAST month some words of advice regarding fire prevention were offered to the executive staff of the works; this month it is the individual worker to whose attention a few points are directed. Fire cannot be prevented effectively and absolutely unless there is complete co-operation between all members of the works staff.

Fire arises by negligence, and by lack of precautions where conditions for an outbreak are particularly favourable. Negligence is a matter which has to be overcome by the individual worker; more careful thinking and less hurry can make a big difference. Some of us are always a little too ready to have our hands in action a fraction of a second in advance of our thoughts, and this state of affairs can be put right by going about our tasks in a steadier manner, by checking all tendency to sudden impulse, and by seeing that all actions follow each other at an even measured pace. It is surprising what a difference a mere fraction of a second makes, and that fraction of a second is really negligible as "time lost." For the true meaning of measured pace, take a lesson from two navvies swinging their sledge hammers upon a spike for breaking up a piece of road, though this sight has been far less common since the introduction of the pneumatic pick, and may have to be revived in the memory of some of us. Alternatively, there is the example of three or four men, all experienced in throwing bricks from one to the other, in the act of loading or unloading a lorry or railway wagon. The bricks, in pairs, pass steadily from one man to the next in perfect measured pace, and the eyes and hands of each man in the chain are keyed rhythmically with his mind; there is no undue hurry, and therefore no faltering.

The Worker's Angle

If your work involves particular fire risks, see that the authorised precautions are followed, and that equipment helps to avoid rather than assist an outbreak of fire. As the worker, it is often possible for you to see a risk from a different angle from that of the man who has ordered and installed the equipment. Therefore, if a certain risk seems to be present, bring this to the notice of the plant supervisor, or to some other responsible person. Circumstances and conditions applying must be discussed if necessary.

Do not let waste accumulate in undue quantity; there should be proper receptacles provided for all waste, and these receptacles should be emptied at regular intervals without fail. Waste material must never be pushed into an odd corner to be out of the way; even if it has no combustible properties, the mere act of pushing it out of the way wherever convenient is bad, because the habit may become established, and the time may come when that waste is one with dangerous properties. Get to know the nature of the materials that you handle; in unforeseen circumstances you may need this knowledge for quick action. There are no materials which are so very "hush-hush" that this information must be withheld from the worker who is in actual contact. Once upon a time, not so many months ago, an outbreak of fire had disastrous results because a worker did not know that a certain vessel contained metallic sodium, although he knew well enough that water was an agent commonly employed for extinguishing a fire.

Keep all gangways clear of obstruction; likewise all doors, especially the main entrance to the building. If empty sacks have to accumulate, see that they are stacked tidily in some convenient part of the building where there is no particular fire risk from hot steam pipes or hot flues or otherwise, and that the back of the stack can be reached as easily as the front. Keep in memory the position of all electrical switches, fire extinguishers, hand lamps, water, gas pipes and cocks, and flues carrying off hot gases from furnace combustion.

Knowledge of Equipment

If any fire-extinguishing appliances happen to be of a pattern that is unfamiliar to you, do not hesitate to have the working explained and ask for a practice use of the appliance if you feel this desirable. The cost of a refill begrudged by the works may prove to be far less than damage resulting from even a very small outbreak of fire, which might have been got under control minutes sooner if the man on the spot had been fully familiar with the appliance he was expected to use. If there is a fire blanket installed as part of the safety equipment, make sure that you know how to use that as well as the extinguishers. As to when and how to give alarm of an outbreak of fire, there should be established rules posted in the works; if there are no proper rules posted up, it is time that someone on the executive staff gave this matter immediate attention, for every employee at a works—whether it is chemical or otherwise—should know just what to do if a fire is

found breaking out in his immediate presence, or if among others he hears the fire alarm sounding. Some people are expected to do nothing more than stand by at their usual working station, and wait for further instructions; but they should know that. Others are expected to report to give assistance in quelling the outbreak, or to help in removing stocks of material which may be dangerous or highly valuable. Of that they may be aware, having had instructions issued to them, but they should also know that certain things may need their attention as part of their normal works duties *before* leaving their usual working station to report.

In quelling an outbreak of fire which appears suddenly, calmness is the greatest asset; most certainly there should be no unnecessary hurry or excitement. The eye should take in all visible circumstances as far as possible without loss of time, for sometimes the flames which are visible demand less immediate attention than the smoke issuing steadily from a hidden position, say at the back of a stack of barrels, where the fire is creeping and gaining a hold. Flame, like smoke, is only the visible indication of fire; it is at the seat of the flames that the jet from a chemical fire extinguisher has to be directed. You may know this, as it is relatively common knowledge, but it is well to remind yourself of it. Flames, moreover, can stretch far from the actual source of the fire if air currents are favourable. Combustible gases produced as the result of heat from the burning material will often ignite at a distance from the actual seat of the fire; in this case there is intermittent blazing and extinction, like the flame that appears on top of the coal in a fireplace in the house, when only part of the coal in the grate is steadily burning.

Chlorinated Naphthalenes*

Guarding Workers from Toxic Effects

FOR over twenty years chlorinated naphthalenes have been used on an increasing scale for insulating wire and in the manufacture of certain electrical equipment, and the increase has been accentuated by the necessities of war. Chlorinated naphthalenes and chlorinated phenyls have excellent electrical properties, show marked resistance to heat and damp, and are practically non-inflammable. In some works the hot concentrated material is used to saturate wire insulation, while in others the compounds are dissolved in organic solvents, the solutions then being used cold to saturate the insulation. In both processes the wet insulated wires are dried in tubes or ovens. It is during this drying process that dangerous concentrations of chlorinated compounds are given off.

It has long been known that these compounds cause acne-like eruptions, and in recent years serious systemic effects have been recognised. During the past year many cases of skin eruption and in addition six fatal cases of a peculiar type of subacute yellow atrophy of the liver have occurred among the workers in two wire and cable mills. At the request of the management of one of these mills, one of the authors undertook an investigation of means to prevent these adverse effects. This mill used the cold process for saturating the wire insulation.

It became apparent that the toxic lesions resulted from inhalation by men working in or near the drying ovens and also by some other method of absorption, presumably through the skin. This fact was clearly shown, because many of the acne-form eruptions occurred among the men operating the saturation baths and not exposed to the inhalation hazard. A few of the eruptions occurred among workmen handling the cold finished wire in a room far removed from any possible inhalation hazard.

Studies carried out over a number of years—mainly between 1936 and the present day—have shown that exposure to chlorinated naphthalenes caused pathological changes in the liver of both human beings and animals, the toxicity of each compound being apparently directly related to its degree of chlorination. C. K. Drinker (*J. Ind. Hyg.*, 1939, *21*, 155) concluded that the permissible limit for air contamination with trichloronaphthalene was 10 mgm. per cu. m.; for tetra- and pentachloronaphthalene, 1 mgm. per cu. m.; for penta- and hexachloronaphthalene, 0.5 mgm. per cu. m.; and for the various chlorinated diphenyls 0.5 mgm. per cu. m.

In a recent personal communication to one of the authors, A. G. Cranch stated that the effect of these waxes on the skin resulting in the appearance of acne is not determined by the presence of chlorine alone, but is due rather to the compound effect of chlorine and a tar derivative. No such marked tendency to acne formation results from exposure to chlorinated petroleum derivatives, such as chlorinated paraffin. When chlorinated naphthalene is combined with chlorinated diphenyl, a more active acne is produced. Liver damage is not likely to occur following exposure to

* Abridged from an article by Dr. H. von Wedel, Dr. W. A. Holla and Dr. J. Denton in *Rubber Age* (New York), 1943, *53*, 419.

chlorinated naphthalene alone, but may occur from exposure to chlorinated diphenyl combined with chlorinated naphthalene or other tar derivatives. The severity of the acne is not correlated in any way with the degree of liver damage which might occur.

Cranch suggests that other factors are probably involved in the cases showing liver damage, besides exposure to chlorinated waxes alone. The important point brought out in this communication was the fact that skin reactions with acne formation had been noted in men handling only the finished product, with no appreciable vapour exposure. As far as he knew, no liver cases had been attributed to skin absorption. He suggests that the absorption of these materials through the skin is very slow as compared with inhalation absorption. Cranch also indicates that prevention depends first on the greatest possible reduction of vapour exposure and skin contact; second, on protection of the skin by means of cold creams and adequate bathing.

In any scheme for the protection of workers, which should be formulated by a committee consisting of the chief plant engineer, the head chemist, and the works physician, no changes should be advocated which will in any way slow down production. Protection must consist of prevention of inhalation, ingestion, and skin absorption of these chemicals. Skin absorption has not in the authors' opinion received proper consideration from the standpoint of systemic effects.

Importance of Ventilation

Toxic effects from inhalation are without question the most important because of the speed of absorption and the probable high dosage of toxic substances absorbed. Therefore, adequate ventilation is the primary consideration in any mill. The mill rooms and mixing house should be ventilated by intake and exhaust fans of sufficient volume and velocity to remove the majority of the fumes. The drying tubes and drying ovens should be adequately ventilated and sealed as nearly air-tight as practicable. To accomplish this, large intake vents should be placed near the floor in the doors of the drying ovens. Large high-velocity exhaust fans and an adequate number of large exhaust stacks leading up above the roof of the mill should be installed. After the steam in the drying ovens has been turned off, fresh cool air from the mill room should be pumped through the ovens for a sufficient time, in sufficient volume and of a velocity of approximately 2000 cu. ft. per minute, to bring down the temperature of the drying ovens to that of room temperature, before opening their doors to unload. Daily analysis should be made of the air in these ovens. They should not be opened for unloading until chemical analysis reveals less than 0.5 mgm. of chlorine per cu. m. The drying tubes should be ventilated by suction applied at the far end of the tubes. The air flow through the tubes should be sufficient to cool the saturated cable to a temperature at which no significant amount of vapour is given off from the cable after it leaves the drying tube.

Design of Vats

The impregnating vats should have permanently hinged covers fitted with flanges that extend downward inside the tank, to avoid soiling the outside of the tank from dripping. These vats should be completely enclosed in a ventilation hood, with a hinged door in front. These hoods should be ventilated through a properly constructed lateral exhaust ventilation system. Various speeds of exhaust should be tried, until the proper speed is indicated by chemical analysis of the air in front of each hood.

In the cold process, the waxes should be introduced into the mixing vats with as little manual handling as possible. Workmen should not be allowed to place their hands inside these vats, even for taking the specific gravity of the mixtures. The chemicals should be pumped outside the mixing house to a loading platform through permanent pipes fitted with proper gate valves. Such pipes should be connected by proper couplings to tank trucks.

At the felting mills the chemicals should be pumped or fed by gravity from the distribution tanks to the impregnation vats through pipes not less than 2 in. in diameter. Each pipe, just before it empties into the impregnation vats, should have a gate valve the full size of the pipe and of simple design so that it cannot become clogged by the mucilaginous fluid.

Treatment of Sludge

Sludge left in the tank should be exhausted through exhaust pipes at least 4 in. in diameter, connected at or near the bottom of each impregnation vat. Such exhaust pipes should extend into receiving sludge vats with a simple gate valve the full size of the pipe near their lower ends. The remains of the asbestos sludge, which does not flow through the pipes, should be scraped out of the vats and pushed into the sludge vats by means of a long-handled square-ended steel paddle. If the exhaust pipe should become clogged, a 4-ft. long steel push rod with a 3-in. flat bell at its end should be used to push the obstructing sludge into the receiving vat. Both the paddle and the push rod should be stored in a vertical metal container. The tops of the sludge vats should be constructed so that their entire top, with the exception of a 1-in. overhang rim, is open. A slide sleeve should be placed in this overhang rim. A strong metal sliding cover should be provided for each vat. An opening to receive

the metal pipe should be placed in the slide cover, fitted with an angle extension to receive the solid 4-in. pipe from the saturation vat.

After the sludge vats have sedimented for an appropriate time, the good fluid wax should be pumped into receiving tanks through a pipe containing a glass observation window. After all the good chemical has been removed from the sludge vats, the remaining sedimented sludge should be dumped into burial ditches by placing the vats in an automatic dumping machine, so that no hand will have to touch the edges of the vats. The vats should not be cleaned out until their inside surfaces become covered with too much hardened chemical. The hardened sludge is then softened with an appropriate solvent and scraped off the sides of the vats with a longhandled square-ended steel paddle.

Elbow length, thin, impermeable gloves should be used by the men when they adjust the nuts and screws of the mechanism in the vats. They should be taken off immediately, when the men have finished the job, to avoid excessive perspiration. The outsides of the impregnation vats should be frequently washed down with a proper solvent, to keep them free from the toxic chemicals.

After the above recommendations have been carried out, the personal factor will have been almost completely eliminated. Clean long-sleeved overalls, fastened at the neck and wrists, should be provided. These clothes should be laundered frequently, daily if possible. Eating and smoking in the workrooms should be strictly forbidden, and the installation of shower-baths must be insisted upon. All new workers should be examined by the plant physician, and all those with a history of jaundice, liver disease, or skin disease should be placed in departments where toxic substances are not handled. All workers in mills where the saturated cables are handled should be periodically examined for skin lesions or systemic effects.

The authors report that, as a result of observing the above precautions in the mill investigated, not one single case of skin eruption or systemic disease, attributable to these toxic compounds, has occurred in this mill in five months. Two deaths and between 50 and 100 cases of acne-form eruptions occurred in this mill in the six months before these changes were instituted.

Parliamentary Topics

Underground Gasification

IN the House of Commons last week Sir P. Hurd asked the Minister of Fuel and Power what were the results of the inquiries which he began to make nine months ago on the gasification of coal underground in Russia, the extraction of fire-damp from coal mines in the United States of America, and the tests made in Scottish mines.

Major Lloyd George: I regret that so far no information about the Russian work on underground gasification has been received. The U.S. authorities have kindly supplied my Ministry with some information about the proposals for the extraction of fire-damp from coal mines in the U.S.A. and this is being examined. As far as I am aware, no tests on underground gasification are in progress in Scotland but I am informed that for some years methane issuing at the surface in a coalfield area in Scotland has been used for the heating of glasshouses.

(*Editorial Note*: This falsifies the Minister's statement on underground gasification that he made in April, when he promised particulars of a small experiment which he believed was being carried out in a Scottish mine.)

Chemical Clothing

More Coupons for Workers

IT has been decided, on the advice of the British Employers' Confederation and the Trade Union Congress, to issue for the current rationing period ten additional clothing coupons to a wide range of manual workers in agriculture and industry, including chemical and metallurgical workers. This extra ration, known as the "Industrial Ten," is similar to that given out in the 1942-43 rationing period and the categories of workers eligible are mainly the same as then. Part-time workers in eligible occupations will be able to apply, if they work 22 hours a week or more, and supervisory workers if they are exposed to exceptionally hazardous conditions.

Coupons will be issued as before through local offices of the Ministry of Labour to employers for distribution to their workers. The coupons will be available to employers and trade union branches from December 15 until February 26, together with the necessary forms of application and the leaflet I.T.44 which gives full details of the workers eligible for coupons and the method of application. Special arrangements are being made for certain industries in which there are some workers wth exceptionally heavy needs.

Welding and Cutting Fires

Simple Rules for their Prevention

TO instruct users of welding and cutting equipment in reducing potential fire losses, the International Acetylene Association, 30 East 42nd Street, New York 17, has prepared a convenient, 16-page booklet entitled "Preventing Welding and Cutting Fires." The booklet contains brief, clear discussions of the chief causes of fires, and practical measures for preventing them, and a copy of it might well be placed in the hands of every welding and cutting operator. It may be obtained in reasonable quantities without charge directly from the International Acetylene Association. Some of its excellent advice is included in the paragraphs which follow.

There are some places in nearly every plant or shop where it is never permissible to do any sort of work which makes flame, heat or sparks. For instance, extreme care is always necessary near explosive gases or inflammable liquids; and such things as smoking, blowlamps, open lights, sparking tools, and every other possible source of ignition must be prohibited. But welding and cutting can be done in most other locations with complete safety if certain reasonable precautions are taken. When a welding or cutting operation is a part of a production process, and arrangements can be made for safeguarding surroundings and the material on which the work is being done, it is rare, indeed, that a fire occurs.

Combustible Materials

Heat sufficient to start fires may come from the oxy-acetylene flame itself; from the metals being welded or cut; from molten slag and metal from the cut; and from sparks which fly from the work. Inflammable gases and liquids, with air or oxygen present, are examples of materials that will flare up at once. Oily waste and rags, and light materials such as burlap, excelsior, cartons, straw and waste paper catch fire less easily but burn vigorously once started. Timber, tarpaulins, rags, and similar materials are even less apt to catch fire than the others mentioned. Yet this is all the more reason why special precautions must be taken with these combustible materials. For fires started in them may only smoulder at first, and then may flare up some time later —due possibly to a gust of air or a natural draught created by the smouldering heat.

The oxy-acetylene flame is itself rarely the cause of a fire—probably because it is so evident to anyone using it that the flame and combustible materials should be kept apart. Heat from the metal being welded or cut may sometimes be the cause of fires, if hot pieces of metal are allowed to touch materials that burn easily. This is more apt to happen in the case of cutting steel and iron, because small pieces are often cut away from larger sections and are allowed to drop to the ground. The smaller or narrower the piece cut away, the more heat it will have absorbed, and the more likely therefore to set fire to combustible materials. Pieces of iron or steel which have been heated to a bright red may retain heat to start fires for 5 to 15 seconds or even much longer under some conditions. Even though the piece may be at a black heat in daylight, it can scorch such things as wood or paper and a fire may start if there is enough draught.

Slag and Sparks

The molten slag that drips or blows from a cut is generally more apt to cause a fire than are pieces of red hot metal. This is because the slag is at the temperature of molten steel when it falls, and therefore it stays hot longer. However, when the slag drops from a height of about 15 ft. or more, it tends to scatter and cool more quickly than would a small piece of red-hot steel dropped from the same height. It has always been good practice to catch slag in a pan of sand or pail of water, to keep wooden floors from scorching or burning, or to prevent concrete floors from spalling.

Because they will often fly in so many directions at once, and because they sometimes travel for a considerable distance, sparks from cutting or welding must be watched most closely to make sure they do not start fires. Sparks from welding work do not usually travel far unless there is a strong draught. They are harmless enough if combustible materials are not too close to the work. Cutting sparks travel the farthest and stay hot longest because of their larger size. Much greater precaution must therefore be taken when using the cutting torch.

Heavy sparks from cutting work may sometimes travel as far as 25 or 30 ft. away from the point of cutting, and can readily set fire to light materials. Severe fires have been started by sparks falling into unprotected oil-soaked engine pits. It is most important to realise that sparks which fly away some distance or roll along the floor may sometimes cause smouldering fires if they come into contact with materials that do not ignite readily. Those who have done welding or cutting know how easy it is for cotton gloves to start smouldering from flying sparks. Smouldering fires may start by sparks getting into cracks in floors and woodwork, or by sparks lighting rags, tar-

paulins, wood chips, etc. Sometimes these fires go out, but sometimes they continue to smoulder and may show up as long as a half hour later.

Welding or cutting work done with portable equipment in temporary locations is much more apt to cause fires, unless suitable precautions are taken, than similar work which is part of a regular production or repair operation. For one thing, the equipment is used in a wide variety of places—quite often places which cannot be made as proof against fire as a welding shop. Sometimes the fire hazards are known only to the local foreman or superintendent. Often an outside contractor brings in welding and cutting equipment, and his men may hesitate to ask for the necessary assistance in preventing fires. Demolition work presents a serious problem of fire prevention owing to the general disorder and litter common on such jobs. Of all fires caused by welding and cutting work, about 80 per cent. are caused by cutting in some place other than a permanent, safeguarded location.

The safest and surest rule to follow in preventing fires is to keep flames, sparks, molten slag and hot metal from coming in contact with materials that will burn. It is particularly important that this rule be observed in and around plants and buildings where sparks or flames from any source would be very hazardous, *e.g.*, in rooms containing inflammable gas or liquid, or any material that easily catches fire. Therefore, never use cutting or welding torches where sparks or an open flame of any kind would be a hazard.

Choice of Location

Before you cut or weld in a new location for the first time, always check with the nearest foreman or superintendent in authority. He may know of some serious fire hazard that you might fail to guard against. When it is possible to do so take cutting or welding work which can be moved to a location where there will be no possibility of starting fires. This must always be done when the metal to be welded or cut is in a place where open flames are barred. This practice may also be sensible in many other locations even if open flames are permitted. If the work cannot be moved to a safe location, materials that burn easily should, if possible, be shifted a safe distance away. If cutting is to be done, this distance may be 30 to 40 ft. or more. Floors should be swept clean before the torch is lighted. If it is not possible to move material that will burn to a safe distance from the work; or if sparks might lodge in wooden parts of the building, or drop through holes or cracks to the floor below, use sheet metal guards, asbestos paper or curtains, or similar protection to keep sparks close to the work in hand. Make sure that the guards are large enough and tight; curtains should be weighted down against the floor or ground so that sparks cannot get underneath. Do not use tarpaulins for shielding sparks. Have someone stand by to watch the sparks and give warning if they begin to get beyond the protective guards.

Always guard the oxygen and acetylene hose from chance of injury on the job. Acetylene escaping from a broken hose line might easily catch fire and transmit fire to cylinders or other materials near. Do not use any oxy-acetylene equipment that is in need of repair. Make sure that torches, regulators, and hose are always in good condition and that all connections are tight. Use soapy water to test for leaky connections.

An oxygen pressure greater than necessary will only cause extra sparks and increase the slag flow, to say nothing of increasing the oxygen expense. Since oxygen and acetylene released from cylinders would make any fire which might break out burn all the harder, store extra cylinders away from important areas.

Finally, when torches have been used in locations where sparks may have lodged in wooden structures or in materials that will burn, and may cause smouldering fires, keep a man at the scene of the work for at least half an hour after the job is finished. Don't forget that heavy cutting sparks sometimes fly 25 to 30 ft. or more and hold their heat for several seconds after landing.

S.C.I. PRESIDENT ON "A CHANGING WORLD"

Speaking at the annual meeting of the Association of Consulting Chemists and Chemical Engineers on "The Consultant in a Changing World," Mr. Wallace P. Cohoe, president of the Society of Chemical Industry, declared that the chemists of America must determine to meet changes with equanimity but never with complacency. As the last war advanced chemical technology fully a generation, so this war might even more greatly advance the importance of chemistry in the field of industry. Chemists of wide experience and proved common sense would always be in demand both in times of plenty and periods of hardship, and would foresee rapidly evolving conditions. Every effort should be made to retain experienced and useful personnel. This could be accomplished, at least in part, by the discharge of incompetents and by sending the imperfectly trained back to college. He expressed the hope that a full co-operation between members of the Association would prevent unnecessary duplication of equipment, space, and personnel.

Drying-Oil Polymerisation

The Importance of Eliminating Oxygen

AT a meeting of the London section of the Oil & Colour Chemists' Association, on November 19, a paper entitled "Drying Oil Polymerisation, 1930-42" was presented by Dr. E. Sunderland. In his review of the work so far conducted, Dr. Sunderland said that oils had been polymerised and fractionated by molecular distillation; esters had been polymerised and attempts had been made at fractionation; fatty acids obtained from the natural oils, or from the reactions of natural oils, had been polymerised, and again attempts had been made at fractionation. Recently, however, two new methods of approach had been used. One was to approach the subject from the point of view of the functionality of the molecules involved, without any prior assumption of a reaction mechanism other than the simple addition mechanism. Then there were special methods, such as the determination of ultra-violet spectra, to determine qualitatively the presence of conjugate unsaturation in polymerised mixtures and fractions derived from them. It seemed, he said, that not sufficient distinction had been made between those methods.

Work with which the speaker himself had been associated, under the direction of Dr. Farmer, was concerned with the investigation of the isolated monomer from elæostearic acid, and to isolate the polymers of elæo-stearic acid and examine them. One means of producing the monomer was by simple distillation of elæo-stearic acid; another was to polymerise the acid and to distil off the cyclic material, which was the monomer. One could obtain about 10 per cent. of the acid converted into a liquid which could be separated by freezing out the elæo-stearic acid.

Evidence for New Theories

It seemed that the main phenomenon involved was chemical polymerisation together with isomerisation (as exemplified by the formation of cyclic materials) and also disproportionation, giving rise to acids of lower unsaturation but of the same chain length as the original material. Undoubtedly there was also hydrolysis, hydrolytic splitting of the glyceride, and splitting of the fatty acids themselves, giving low-molecular products. Further, one obtained much product which was higher than dimeride. The acids, therefore, must be at least bi-functional in nature, with the possible exception of oleic acid. Little was known with any degree of certainty concerning the structures of the polymerisation products, but there was some evidence for new theories concerning the course of the reaction. There had, up to now, been far too much speculation, and far too many people prepared to take notice of that speculation. Chemical superstitions had grown up in this field more than anywhere else, and there had been far too little criticism. Emphasising the need for starting with pure materials, he said there was no easy way. It was necessary to stick to simple conditions, to eliminate oxygen, and so on. Further, the polymeric fractions must be separated.

With regard to future means of approach, Dr. Sunderland said that molecular distillation could still help a lot. Its limitation was that it was impossible to work at molecular weights above about 1000, so that it was necessary to modify methods and work with the lower polymers. Solvent extraction had not been sufficiently applied, while chromatography would yield a lot of information, as would also the ultra-violet spectroscope, Raman spectra, work on synthetic analogues, and lastly, the electron microscope. Finally, he suggested that, if a sum of between £50,000 and £100,000 were allocated to the work, we should within ten years break the back of the problem and be well on the way to a reasonable solution.

An Interesting Discussion

In the discussion that followed, the chairman (Mr. N. A. Bennett) said the work of Dr. Sunderland indicated some very remarkable shifts of double bonds in oils, much bigger shifts than perhaps a very large number of chemists had realised. He had also made a very useful contribution in revealing the dimer theory—that the dimer was the limit of polymerisation—as very much open to doubt. When one knew something about polymerisation and isomerisation and how to control it, and the sort of products that one should start with, one could well imagine that the oils with which chemists would have to deal a few years hence would be very different and very much better substances than those with which they had had to deal hitherto.

In reply to Dr. R. F. Bowles, who asked whether the cyclic material which was isolated by Dr. Sunderland, and which was a constituent of the polymerised oil, was present in a proportion which was negligible from the industrial point of view, Dr. Sunderland said that, under the conditions which he had used, *i.e.*, working with free acid or with ester, he did not think there was any chance of a large proportion of the mono-cyclic material being left in the residue. But the conditions applying in an oil, of course, were quite different. If one dealt with a straight acid, one could achieve very much more complete polymerisation than in the

case of an oil; there was no gelation to stop it. In the case of an oil, however, it was possible that gelation might occur by dimerisation and possibly trimerisation, and one was left with loose ends of fatty-acid chains which did not give conditions for polymerisation. But they were at a temperature at which cyclisation might occur quite readily, and it was quite possible that the percentage of cyclic material obtained from an oil polymerisation would be much higher than that obtained from the ester. However, the question of the cyclic material did not apply only to the monomer; it was quite certain that the dimer and trimer were at least cyclic to some extent.

Mr. C. E. Hollis supported Dr. Sunderland's plea that in drying-oil experiments one should start with pure materials, for it was quite apparent that even small traces of oxygen, which got into the materials so easily, were very likely to affect the course of subsequent reactions. The removal of oxygen added much to the labours of the chemist.

Work with Thin Films

Mr. W. Garvie asked what was the method of carrying out the polymerisation in the experiments mentioned—whether in quantities in a beaker or pot, or in thin films—for that was extremely important in fundamental research. He suggested that progress would be made by heating the materials in the form of films on controlled heated surfaces; the movement of the film would allow the by-products to get away before they had time to complicate the reaction. When experimenting with thin films one was amazed by the amount of low boilers that could be taken off. Another method, involving the heating of thin films and then putting them into an expansion chamber, gave very rapid atomisation of the liquid and the ideal conditions for the elimination of the absorbed low-boiling substances, which latter had a profound effect on the course of the reaction.

Another point, again based on experience of complex raw materials, was that two samples of resin which were exactly alike, as shown by the normal methods of analysis, would reveal enormous differences in respect of dielectric constant if they were dissolved in samples of the same oil. That method of using the dielectric constant had been used in attempts to assess the purity of some substances. It had been shown quite recently in one case that the lower dielectric constant of one sample as compared with another, when dissolved in oil, was due to the presence of an oxide; and that recalled the point made by Dr. Sunderland and Mr. Hollis concerning the extreme importance of the influence of oxygen on the course of the reactions.

Dr. Sunderland said that all kinds of methods had been adopted for polymerisation. Polymerisations had been carried out at normal pressures in inert atmospheres; but the vast majority of people polymerised at too high a temperature, in his opinion. Polymerisation had been carried out in the presence of oxygen, and in many cases in *vacuo*, in sealed tubes. The nearer one could get to the complete absence of oxygen, the more reliable would be the results in the determination of polymerisation.

Replying to a question as to whether better drying oils would be produced as the result of the suggested expenditure of £100,000 on research, he said that no one could indicate what useful results would accrue from such expenditure. But since the paint, printing-ink, and linoleum industries relied on the polymerisation of oils, the more we knew about it the better. It would be less expensive ultimately to attempt to solve the problems of polymerisation in that way than to continue to spend small sums *ad infinitum*.

Mr. Grieves, discussing the technical application of experiments, said that one of the chief difficulties was that reactions occurred at different speeds on a works scale and on a laboratory scale. He asked if Dr. Sunderland had seen evidence of two kinds of reactions occurring, or one reaction occurring at different speeds, first in the bulk of the reacting material, and secondly at the surface of the containing vessel. In other words, were there both homogeneous and hetrogeneous reactions? Dr. Sunderland replied that he had no direct evidence, but it was almost certain that wherever there was a surface something would happen there which did not happen in the bulk of the liquid. The only precaution that one could take was to ensure that the surfaces were as clean and as non-reactive as possible.

PROPERTIES OF RED BRASS

The effects of gaseous "impurities" of red brass have been studied by Gardner, Krynitsky, and Saeger (*J. Res. Nat. Bur. Standards*, 1943, *31*, 3, 125). Chemical analysis of the metal (Cu 85, Sn 5, Pb 5, Zn 5) after being melted and poured under various gases used as enveloping atmospheres, showed no significant changes in composition. Hydrogen and methane had deleterious effects on the tensile properties, hardness, and density of both sand-cast and chill-cast bars, the detrimental effect of hydrogen being the most pronounced. Micrographs showed that a degree of unsoundness, due to voids, was found to be characteristic of the metal which had been melted under hydrogen, and almost all the differences in properties noted can be satisfactorily explained from this structural feature. Attempts to cast the alloy in a vacuum resulted in complete failure on account of the excessive volatilisation of the zinc.

Government Fuel Research

Some Notable Achievements

IN an address to the Institute of Fuel at Newcastle-upon-Tyne on Monday night, Dr. A. Parker, Director of Fuel Research of the Department of Scientific and Industrial Research, said that the outstanding scientific and technical achievements of this country, especially during the war, have proved beyond doubt that our scientists are at least equal in ability to those in any part of the world. Though the quality of our scientific work is not surpassed anywhere, we have lagged behind some other countries, for example Germany and the United States, in the amount of research. This is because the value of scientific research has not been sufficiently recognised and in consequence the number of trained scientists in this country has been relatively small. If we are to occupy a prominent place in world affairs after the war, there must be a great expansion in our scientific research and in the application of science in industry.

A Unique Organisation

History repeats itself. Exactly the same conclusions emerged from our experience during the war of 1914-1918. Between 1918 and 1939 there was a considerable expansion in scientific training and research activities, but the expansion was neither so rapid nor so extensive as desirable. It was during the last war that the Government gave a lead by establishing the Department of Scientific and Industrial Research. One of the first activities of this new department was to set up the Fuel Research Board to investigate, in the broadest national interest, the nature, preparation, utilisation, and treatment of coal and other fuels, and their products. The establishment of the Government Fuel Research organisation was in itself an innovation, for nowhere else in the world was there at that time an organisation on quite the same lines. To-day, this State organisation, with a staff of more than 250, includes the central Fuel Research Station equipped not only for experiments in the laboratory, but also for experiments on a semi-commercial scale and on a full commercial scale. The full-scale units include plants for cleaning, drying, and pulverising coal, for the manufacture of fuel gases, hydrogen, and coke, and there are full-size boilers of several kinds. Much experimental work has been undertaken not only at the Fuel Research Station but also at industrial works in co-operation with industry.

In addition to the Fuel Research Station, there are nine Coal Survey Laboratories in various parts of England, Scotland, and Wales which have been undertaking, in collaboration with the Geological Survey of the Department, a comprehensive survey of the qualities of the national coal resources. This survey is now being put on a quantitative basis in co-operation with the Coal Commission and the Ministry of Fuel and Power. As a result of this survey, we already have much more information about our coal reserves and the coals on the market than there is about the coals in any other country. This information has been of immense value during the war and further information has been rapidly collected. Without such information economic planning of the use of the coal reserves in the future would be impossible. Planning of this kind is becoming of great importance, because some of the coals with special properties, for example, coals of most value for making gas and coke, are limited in quantity and should not be used for purposes for which other more abundant coals are suitable.

Referring to some of the achievements in fuel research, Dr. Parker said that simple equipment had been developed for fitting to large industrial boilers, which not only greatly reduced the quantity of smoke from the boiler chimney but increased the efficiency of the coal in raising steam. A large number of boilers in commercial use were now fitted with this equipment. Work on transport producers using coal and coke in place of petrol for road vehicles was begun at the Fuel Research Station before the war. This work led to the introduction of the Government Emergency Producer now in use on many road vehicles with a consequent saving in petrol.

Chemicals from Coal

Much is heard nowadays about processes for the production of petrol and other oils and chemicals from coal. Processes of this kind have received considerable attention at the Fuel Research Station, where a great deal of information has been obtained from experimental work on the distillation of coal, on the hydrogenation of coal and of tar, and on synthetic methods of producing oils and chemicals from gases made from coal and coke. Coal is likely to continue to be used for many years in much greater quantity as a direct or indirect source of heat, light, and power, than as a basis for the manufacture of valuable chemicals. At the same time, as scientific knowledge advances, there will be an increase in the number, variety, and extent

of processes employing coal as a base material for oils and chemicals of many kinds.

If this country is to maintain its position in industry, we must rapidly develop our scientific and industrial research in relation to coal and other fuels, in the widest national interest, and we must show initiative and enterprise. It must no longer be true to say that our scientists make the fundamental discoveries, while we leave other countries to develop and apply them in industry. There must also be a spirit of mutual help in research, involving friendly discussion and collaboration between the scientists in universities, in Government establishments, industrial research associations, and other research organisations. In relation to fuel in this country, a good beginning in this direction has already been made. The Department has set up a consultative conference on fuel research, which is attended by representatives of the research associations interested.

In his concluding remarks, Dr. Parker issued a note of warning. He said that where there is a lack of the real appreciation of the conditions under which successful research is carried out, there is an impression that if large sums of money are provided for research, marvellous discoveries would follow as a matter of course. While adequate financial provision was naturally essential, it was not in itself enough. The primary requirement was men of the right training and outlook. If they were not available, the money allocated for research would largely be wasted; and it is just as easy to throw away money on research that is ill-planned as on anything else.

Personal Notes

DR. WILLIAM CULLEN is retiring from the Chemical Council at the end of the current year.

MR. T. WATSON, commercial manager of General Refractories, Ltd., Sheffield, since 1931, has been appointed to the board of directors.

MR. JOHN R. PETRIE, principal of Openshaw Municipal Technical School, Manchester, has been appointed principal of St. Helens Municipal Technical College.

DR. ALEXANDER FLEMING, Professor of Bacteriology at London University, the discoverer of penicillin, and DR. HOWARD W. FLOREY, Professor of Pathology at Oxford, who developed the therapeutic application of the drug, are jointly to receive the annual award of the American Pharmaceutical Manufacturers' Association. This is presented for the most important contribution to the scientific advancement of medicine in 1943.

SIR ROBERT ROBINSON and PROFESSOR I. M. HEILBRON visited America recently. Among the chemical plants they inspected were the works and laboratories of the Hercules Powder Company at Wilmington.

DR. ALEXANDER C. WEST, B.Sc. (St. Andrews), Ph.D. (London), formerly principal of Croydon Polytechnic, has been selected for the new post of director of Robert Gordon's Technical College, Aberdeen.

Among recent American visitors to this country was DR. DONALD P. KEYES, chief of the Chemical Industries Branch of the U.S. Office of Production Research and Development. Dr. Keyes, who is head of the Chemical Engineering Department of Illinois University, came here to discuss with the Ministry of Production and other Government departments the transatlantic exchange of technical information.

The following have been elected by ballot to serve as officers and committee of the London Section of the British Association of Chemists during the year 1943/44, at the resumed annual meeting held on December 4: *Chairman*, T. MCLACHLAN; *Treasurer*, W. C. PECK; *Hon. Secretary*, J. STEWART COOK; *Committee*: G. H. CLARKE, K. MACKENZIE-RICHARDS, F. M. WRIGHT, R. H. MORGAN, J. E. EDWARDS, W. A. SNOW, and MRS. S. M. L. TRITTON.

MR. A. J. C. WALTERS, who has been general secretary of the Cotton Board for over three years, has accepted an invitation to become director and secretary of the British Rayon Federation. He will take up his duties early in 1944. Mr. Walters has previously held appointments with the Manchester and the Sheffield Chambers of Commerce, and before returning to Manchester to serve on the Cotton Board, had been Controller of British Industries House, in London.

Obituary

MR. PETER OWEN BYRNE, who died in Edinburgh on December 11, was chairman of Barry, Ostlere, and Shepherd, Ltd., linoleum manufacturers, of Kirkcaldy, London, Glasgow, etc.

It is now presumed that MR. CYRIL BUCHAN, of Swansea, a metallurgist with I.C.I., Ltd., was drowned when the liner *Ceramic* was sunk by enemy action. Mr. Buchan was on his way to South Africa to take up an important Government post.

MR. ARCHIBALD A. LAWRIE, of Central Farmers, Ltd., Aberhill, Methil, died in hospital on December 10. He had served with this well-known Fife fertiliser company for about ten years as secretary, and was well known in chemical and fertiliser circles in the East of Scotland.

General News—From Week to Week

The British Pharmacopœia Commission has decided to open the Pharmacopœia to drugs that are the subject of patent rights.

Eight experimental houses are being built for the Building Research Station to enable full-scale scientific tests to be made into general problems of building construction.

A department for chemotherapeutic research has been formed at the Liverpool School of Tropical Medicine, under the direction of Dr. E. M. Lourie.

The Chemical Council has decided to call a conference of all chemical societies and kindred organisations to discuss matters relating to the finance of publications, the provision of premises and other methods of collaboration.

The University Grants Committee has been expanded, and its membership now numbers 15. The Chancellor of the Exchequer last week gave a list of its members. It included several distinguished scientists, but, so far as we can see, no chemists.

The soil-analysis service of the Macaulay Institute for Soil Research, Aberdeen, resulted last year in over 4000 soil samples being analysed. In the development of the station's spectrographic work some 7000 samples were examined.

Since 1940 the Red Cross and St. John has sent over 21 million parcels of food and comforts to British prisoners and internees in European prison camps. To help meet the cost of this continuing service 13 million Penny-a-Week Fund contributors are raising £90,000 every week.

The fund to defray the cost of equipping the laboratory of the new Stalingrad hospital has now passed the target figure of £3000. The bulk of the money was subscribed by British scientists, and the fund was initiated and sponsored by the Association of Scientific Workers.

Wholesale prices in November once again showed little change, only a small rise in the Board of Trade index figure (1930=100) being recorded in the class of chemicals and oils (October, 150.6; November, 150.7). This was again due to an increase in the price of fertilisers, this time rather less than 1 per cent.

The failure to co-opt scientific research workers into the new Scottish Advisory Committee for post-war educational needs has been stressed by Mr. A. G. Kay, of the Scottish area of the A.Sc.W. The committee has no representative of the modern light chemical and scientific industries on its board, the only industrial members being representatives of the heavy engineering industries.

Nearly a ton of waste paper has been used in the manufacture of a consignment of insulation board which is helping in the production of penicillin. As it is important that there should be no loss of heat from the laboratory while the mould is forming, the new laboratories which are being constructed for the manufacture of the drug are lined with insulation board, which is partially produced from waste paper.

Silicosis among workers engaged in the dressing and fettling of steel castings caused six deaths last year. The same number of deaths occurred among sandblasters of metal articles. The corresponding averages for the four preceding years were 4.5 and 4.5 respectively. In 1942 the numbers of total disablement and suspension certificates issued in respect of the disease for the two occupations were respectively 20 and 3.

Electron microscope photographs of the crystalline compounds produced when Portland cement is hydrated are reproduced in *Ind. Eng. Chem.* (1943, *35*, 11, p. 1178). The calcium hydroxide was found to yield spheres and a fibrous mass; the dicalcium silicate hydrate appeared as rhombic slabs, and possibly as amorphous sphaerulites, while the tricalcium aluminate hydrated to form thin hexagonal plates, rhombic slabs, needles and possibly amorphous sphaerulites, and the calcium sulphoaluminate complex formed heavy needles.

The toxicity of metaphosphates has been a matter of controversy of recent weeks. A note in *The Pharmaceutical Journal* of December 11 (p. 219) now states that no harmful effects were found in experimental animals which received drinking water containing 200 parts per million of sodium hexametaphosphate. These results, obtained in the Pharmacological Laboratories of the Pharmaceutical Society, confirm observations made by Murray in America and establish its non-toxicity for practical pharmaceutical purposes.

The synthetic hormone, stilbœstrol, has been tested during the last two years in a series of experiments under the co-ordination of the Agricultural Research Council. To induce lactation in barren heifers and cows, the technique used has been to implant a number of tablets of stilbœstrol under the skin, and the results of the trials indicate that about 50 per cent. of the treated animals have produced an economic quantity of milk. On the other hand, certain serious side effects have been produced in a proportion of the beasts, which suggest that another hormone, not represented in the synthetic preparation, must be involved in the natural control of lactation.

The blackening of cooked potatoes, a phenomenon which may be due to the conversion of ferrous iron into black ferric oxide, appears to be influenced by the fertilisers applied to the potato crop. According to results published in the *Journal of the Ministry of Agriculture* (1943, *50*, 9, p. 425), it seems that the blackening may be due to a deficiency of potash and phosphate. Presumably both deficiencies cause accumulation of iron in the tubers.

The recommendation of the Chemical Council that two representatives of the British Association of Chemists should be co-opted forthwith as members of the Chemical Council has not received "the separate and collective approval" of the councils of the three chartered bodies. The chairman of the Chemical Council has informed the B.A.C. that under present circumstances its representation on the Council is not possible.

Foreign News

The German paper published in Croatia announces that a dye works is being added to the Textile Industry Company's works at Varazdin.

Australia is to export to America, during the next year and a half, 1000 ounces of the drug hyoscine, prepared from Duboisia leaves.

The Hungarian Government is to prospect for mineral oil in the Bacska district on the river Tisza. The presence of natural gas at Szilagy and Zombors raises a hope of successful results.

A new synthetic rubber called Uskol has been introduced by the U.S. Rubber Company. It is said to contain ingredients never before used in the production of synthetic rubber.

Because of a serious depletion in stocks of the better qualities of mica, the U.S. War Production Board has restricted the consumption of mica to the average rate maintained during the first nine months of 1943.

Abstracts on penicillin and other antibiotic substances are published as a 70-page booklet by the National Research Council, Ottawa. The report—N.R.C. No. 1160—is obtainable from Canada at the price of one dollar a copy.

About 200,000 volumes, including a valuable collection of scientific periodicals and of the publications of learned societies all over the world, were lost to science when the Germans deliberately destroyed the library of the Royal Society of Naples before evacuating the city. A force of 600 soldiers entered the building, soaked the books with petrol, flung in hand grenades, and, having shot two guards who attempted resistance, kept the civil fire brigade at a distance while the library burned.

An oxygen factory is to be established in Medellin, Colombia. The capital of 200,000 pesos is being subscribed by Swiss and Colombian interests, and a Swiss company will erect the plant and supply the machinery.

The total value of chemical and pharmaceutical products exported from Brazil in the first half of 1943 was 28,427,000 cruzeiros, compared with 12,716,000 in the corresponding period of 1942.

Under the renewed trade agreement between Spain and Switzerland, Switzerland will continue to export the basic products of her chemical and pharmaceutical industries, in exchange for wines, fruits and cork.

The cultivation of oil-bearing plants in Sweden has greatly increased during the last two years, in accordance with the policy of independence from imports of fodder, vegetable oils, and margarine. Agricultural research institutes are now studying soya cultivation.

Two Hungarian factories are to start production of sugar from wood, reports the Stockholm *Tidningen*. These factories will be situated in the Carpathians and each will be able to deal with about 10,000 wagons of wood-waste at a time. Fodder-yeast and alcohol will also be produced.

Danger of poisoning by chlorinated hydrocarbon vapours is being emphasised in American medical circles. Dr. Arthur J. Geiger recently pointed out that trichlorethylene and carbon tetrachloride, for instance, can result in a highly dangerous heart condition that is often fatal.

Babassú oil, derived from the kernels of South American nuts, is being used in soap and explosives manufacture, and in the production of bullet-proof glass, reports the U.S. Department of Agriculture journal, *Agriculture in the Americas*. It is suitable, too, for use in diesel engines.

A shortage of seaweed products is being experienced in the U.S.A., and new sources of supply are being sought by two laboratories of the Fish and Wildlife Service and at least a dozen State and private institutions. The search is centred on seaweeds which will yield commercial agar.

Metal-working tools made of phenol-formaldehyde plastics are being used in Germany. Plastics were introduced into this field before the war, when parts of tools, such as the upper and lower parts of jigs and parts of rolling mills for sheeting light metals were prepared from synthetic resins.

Annual recovery of fats from industrial plants in the U.S.A. is expected to exceed 100,000,000 lb., states the Fat Recovery Committee of the Chicago section of the American Chemical Society, which is co-operating with the War Production Board in this salvoge project.

Forthcoming Events

At the meeting of the **Oil and Colour Chemists' Association,** London section, to be held at the Charing Cross Hotel, at 2.15 p.m., on **December 18,** Mr. R. M. Wheeler will lecture on "Photography in the Paint Laboratory."

The **Electrodepositors' Technical Society** meets on **December 20,** at 5.30 p.m., at the Northampton Polytechnic, St. John Street, London, E.C.1, to hear a lecture by Mr. R. W. Harrison, on "Costing of Electroplating Processes."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Satisfactions

DENHAM LABORATORIES, LTD., Middlesex. (M.S., 18/12/43).—Satisfaction November 25, of debenture stock registered January 18, 1938, to the extent of £8,200.

LANGLEY ALLOYS, LTD., Slough (M.S., 18/12/43).—Satisfactions November 29, on mortgages registered August 5 and October 7 and 17, 1942.

Company News

British Tar Products, Ltd., report a net profit to September 30, of £48,867 (£55,862).

The Distillers' Co., Ltd., is paying an interim dividend of 6¼ per cent. (same).

The Imperial Smelting Corporation announces a consolidated net profit, for the year to June 30, of £148,114 (£166,807).

Walles Bitumastic, Ltd., announce a net profit to September 30, of £21,618 (£14,883) and a trading profit of £72,793 (£77,383).

Midland Tar Distillers, Ltd., announce a net profit, for the year to June 30, of £27,520 (£26,068). Ordinary dividend, 7 per cent. (5 per cent.).

British Celanese, Ltd., have made a record trading profit of £3,369,147 (£3,152,115) for the year to July 3. Net profit is £348,403 (£403,495).

Manbré and Garton, Ltd., are paying an ordinary dividend of 17 per cent. (same) for the year to September 30. The trading profit (after depreciation) is £463,391 (£512,899).

Turner & Newall, Ltd., have announced a final ordinary dividend of 8¾ per cent., making 12½ per cent. (same) for the year to September 30. The trading profit has risen from £2,407,550 to the record figure of £2,710,801.

British Benzol & Coal Distillation, Ltd., report a trading profit, for the year ended October 31, of £84,074 (£96,207), and a net profit of £28,361 (£16,509).

Timber Fireproofing, Ltd., have made a net profit, for the year to September 30, of £3493 (£5003), and are paying an ordinary dividend of 10 per cent. (10 per cent. and 5 per cent. bonus).

Lewis Berger & Sons, Ltd., announce a final ordinary dividend of 10 per cent., making, with bonus 3 per cent., a total of 19 per cent. (same) for the year ended July 31. Net profit, after tax deduction, was £188,791 (£200,907).

New Companies Registered

Tucker Proprietaries, Ltd. (384,060).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of and dealers in insecticides, germicides, fertilisers, chemicals, drugs, disinfectants, etc. Directors: H. L. Tucker; R. H. Crook; T. Rawlinson. Registered office: St. James House, 44 Brazennose Street, Manchester 2.

Anglo-Continental Trade & Industry Development Co., Ltd. (383,899).—Private company. Capital: £100 in 100 shares of £1 each. Importers and exporters of chemical products, manufacturers of and dealers in chemical, horticultural, agricultural, and other preparations, etc. Subscribers: E. A. Clifford; Emily E. M. Sheppard. Registered office: 43 Sloane Street, S.W.1.

Permaseal Plastics, Ltd. (383,972).—private company. Capital: £300 in 300 shares of £1 each. Manufacturers of and dealers in plastic, modelling and moulding materials and plant for making same; in rubber, gutta-percha, and vulcanite, and goods manufactured therefrom, and in gums, glues, cements, chemicals, etc. Directors: H. Harper; J. J. Lorant; J. E. Saytch. Registered office: 46 Victoria Street, S.W.1

Solway Chemicals, Ltd. (384,258).—Private company. Capital: £10,000 in 60,000 ordinary shares of 1s. each and 7000 cumulative participating preference shares of £1 each. Merchants, dealers, importers, exporters, shippers, and manufacturers of chemicals, oils, greases, etc. Directors: F. A. Schon; F. Marzillier; W. C. Sumner. Registered office: 78 Lowther Street, Whitehaven.

Chemical and Allied Stocks and Shares

THERE has been no improvement of business in the industrial and other sections of the Stock Exchange, and, on balance, movements in values were small owing to the very moderate demand in evidence.

In accordance with the general trend, British Funds tended to ease. Imperial Chemical at 38s. 6d. were virtually the same as a week ago, as were Lever & Unilever at 34s. 9d., and Borax Consolidated at 34s. 6d. Turner & Newall were steady at the higher level of 77s., aided by the good impression created by the financial results; despite a substantially larger provision for taxes, net profits are higher at £553,292, compared with £530,840. The dividend, which is again 12½ per cent., is a conservative payment and permits a further £100,000 to be placed to reserve.

B. Laporte remained at 75s., and W. J. Bush at 60s.; the shares continued firmly held, and few dealings have been recorded recently. Triplex Glass at 36s. 9d. were within 3d. of the level ruling a week ago; as in many other instances, sentiment was governed mainly by hopes of scope for recovery in dividend payments after the war. There was a further rise from 43s. 6d. to 44s. 6d., in Barry & Staines. Nairn & Greenwich showed improvement to 66s. 3d. Wall Paper Manufacturers deferred were 6d. higher on balance at 39s. 6d. Lewis Berger have been firm at 93s. on consideration of the financial results, which show that the 19 per cent. distribution is conservative. The increase in the company's trading profits is attributed to larger output resulting from continued reorganisation of production methods and technical improvements of manufacturing processes, full benefit from which, it is added, is not shown in earnings because of increased costs, and the restriction of profit margins. Elsewhere, International Paint shares were 110s., and Pinchin Johnson 10s. ordinary 34s. 3d. Goodlass Wall 10s. ordinary transferred around 16s., while Paripan 5s. shares were 25s., and Cellon 23s. British Glues 4s. ordinary were 7s. 9d., at which the yield is fully 5 per cent. on the basis of the 10 per cent. dividend that has ruled for some years; actual earnings on the shares have been well in excess of dividends paid.

Movements in the iron, steel and allied groups were small, but in some instances the tendency was better. Stewarts & Lloyds improved from 51s. 3d. to 51s. 9d., and Tube Investments from 89s. to 90s. Owing to higher profits last year, the recently-issued results show that 35 per cent. was earned on the ordinary shares of the last-named company, so that the dividend, which is again 20 per cent., is covered with a substantial margin. United Steel shares were 24s. 9d., Dorman Long 28s. 3d., and Guest Keen 33s. 1½d. Richard Thomas 6s. 8d. ordinary were quoted at 9s. 10½d. There was a better tendency in textile securities, sentiment in regard to which responded to encouraging views of the post-war outlook for the industry. Compared with a week ago, Bradford Dyers have risen from 20s. 6d. to 22s. at the time of writing, Bleachers from 10s. 6d. to 11s., and Calico Printers from 15s. 6d. to 16s. 3d. The market is hopeful that Bradford Dyers will be able to resume dividends on its ordinary shares in 1944. Among rayon shares, British Celanese at 28s. 9d. were the same as a week ago; Courtaulds moved up from 50s. 9d. to 52s.

In other directions, Monsanto Chemicals 5½ per cent. preference remained at 23s. 6d. Greeff-Chemicals 5s. ordinary were again 7s. 3d., while Burt Boulton continued to improve under the influence of satisfaction with the recently-issued results, and were 22s , a rise of 6d. on balance. British Oxygen were higher at 77s. 3d. Among plastics, De La Rue were 157s. 6d., British Industrial 2s. ordinary were 6s. 7½d., and Erinoid again 10s. 6d. Boots Drug have been maintained at 41s. 6d., Sangers at 23s. 6d., and Timothy Whites at 33s. 6d. Among oil shares Anglo-Iranian have risen on balance from 112s. 6d. to 115s. 7½d.

British Chemical Prices

Market Reports

TRADING conditions on the London industrial chemicals market have been moderately active, the movement in most sections being on a steady scale. Negotiations for deliveries during the next half-year are now occupying the attention of consumers, and it is understood that a fair amount of contract renewal orders have been placed. Prices during the past week have been steady with a firm undertone. So far as the potash products are concerned, careful distribution of available supplies of some products is enabling essential requirements to be covered, and a good demand is reported for the pharmaceutical and technical grades of permanganate of potash. No changes are reported from the soda products section, and in other sections of the market buying continues to be reasonably steady. The movement in the coal-tar products market has been good during the past week and an active demand persists for crude carbolic acid and the benzols and toluols. Pitch is well held.

MANCHESTER.—Quotations on the Manchester chemical market during the past week have been on a very firm basis in virtually every department and, if many actual advances are unlikely in the near future, there is certainly very little prospect of any recession. Leading industrial users of heavy chemicals, who are now fairly well covered forward, are taking steady deliveries of the bread-and-butter lines, including the alkalis, and there has been a moderate volume of additional inquiry on the market

during the past week. The tar products, of both the light and heavy descriptions, are mostly finding a ready outlet at stable prices.

GLASGOW.—In the Scottish heavy chemical trade the position is unchanged from last week, home business remaining steady. Export trade is still rather restricted. Prices keep very firm at previous levels.

Price Changes

Pitch.—MANCHESTER, 60s. to 62s. 6d. per ton, f.o.b.

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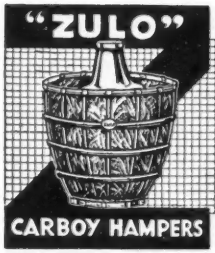

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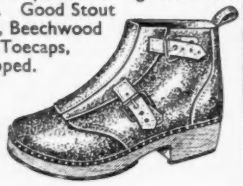

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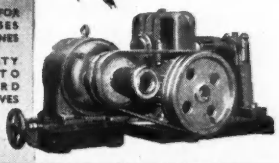

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Printed in Great Britain by THE PRESS AT COOMBELANDS., London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4., December 18th, 1943. Entered as Second Class Matter at the New York, U.S.A., Post Office.

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